

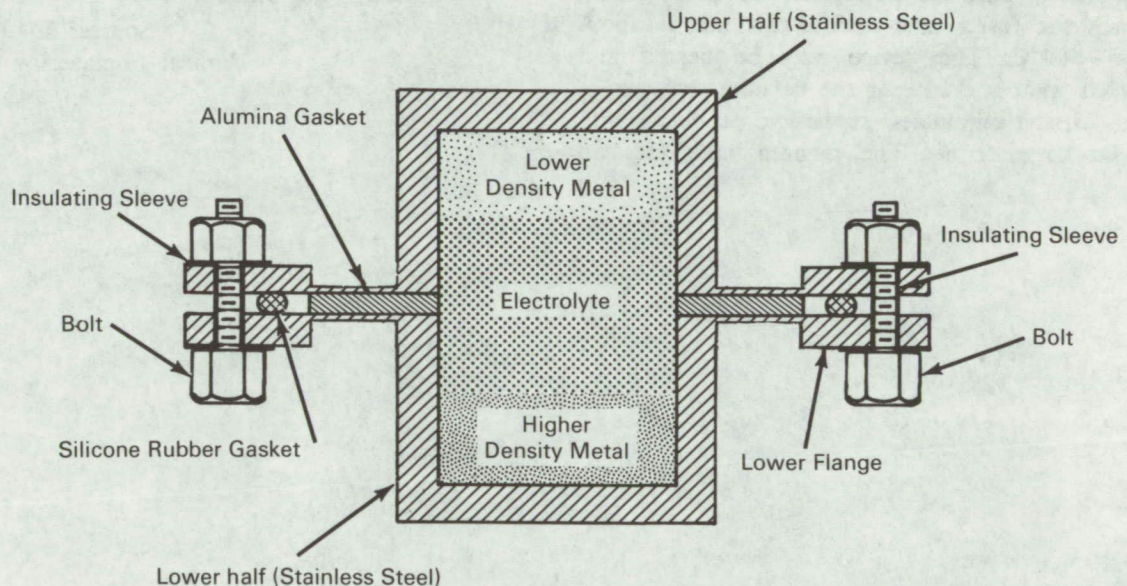


# AEC-NASA TECH BRIEF



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## Rubber and Alumina Gaskets Retain Vacuum Seal in High Temperature EMF Cell



### The problem:

To retain a vacuum inside a high temperature EMF cell in which higher and lower density liquid metal electrodes are separated by an intermediate density fused salt electrolyte. At the same time, electrical separation between the upper and lower valves of the cell should be maintained. Conventional vacuum sealing methods cannot be used because either the seal fails due to the high temperature or it does not electrically insulate the cell halves properly.

### The solution:

A silicone rubber gasket and an alumina gasket, each held between two flanges which extend out from

the edges of the upper and lower halves of the cell. The rubber gasket preserves the vacuum seal and the alumina gasket electrically separates the two cell halves.

### How it's done:

A heat dissipating flange extends horizontally from the bottom edge of the upper cell half, and a similar flange extends from the upper edge of the lower cell half. An alumina gasket is positioned between the upper and lower flanges so that its inner edge is close to the inner surfaces of the cell halves. A silicone rubber gasket is also placed between the flanges, but outside the alumina gasket. Bolts which

(continued overleaf)

hold the two cell halves together pass through the flanges within insulating sleeves outside the silicone rubber gasket position.

The alumina gasket serves as the liquid seal and at the same time electrically separates the upper and lower cell halves. The fused salt electrolyte in contact with the alumina gasket may penetrate cracks along the edges of the alumina gasket, but such penetrations will freeze-seal themselves so that neither the electrical insulating effect nor the vacuum seal maintained by the silicone rubber gasket is disturbed. The silicone rubber gasket is far enough removed from the electrolyte so that most of the heat transmitted along the flanges is dissipated to the outside atmosphere before it reaches the rubber gasket.

**Notes:**

1. This innovation is in use at Argonne National Laboratory on a Na-Bi regenerable EMF cell in which the fused salts and metals are at about 500°-600°C. The device may be heated and cooled without damaging the vacuum seal.
2. This design eliminates expansion problems with dissimilar materials. The vacuum holds the two

cell halves together while the alumina gasket holds them apart.

3. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation  
Argonne National Laboratory  
9700 S. Cass Avenue  
Argonne, Illinois 60439  
Reference: B66-10472

**Patent status:**

Inquiries about obtaining rights for commercial use of this innovation may be made to:

Mr. George H. Lee, Chief  
Chicago Patent Group  
U.S. Atomic Energy Commission  
Chicago Operations Office  
9800 S. Cass Avenue  
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